

REMARKS

Claim 18 has been amended to recite the step of applying a laser beam to the flange portion of the chip in an oblique direction to both the joint face of the electrode base metal of the ground electrode and to the side surface of the protrusion as shown in Figs. 5 and 6.

New claim 30 depending from claim 18 corresponds to claim 4.

Review and reconsideration on the merits are requested.

Claims 1, 2, 4-6, 9, 12 and 27-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,215,235 to Osamura in view of U.S. Patent No. 4,581,558 to Takamura et al. further in view of U.S. Patent Application Publication No. US 2001/0030495 to Kanao et al. Claims 13-17 and 21-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Osamura in view Takamura et al. Claims 18, 25-26 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Osamura in view of Kanao et al.

Kanao et al. is newly cited as showing a spark plug (Fig. 2) having a chip 60 having a flange portion 62, the flange extending outward of imaginary extension lines of a side face of a protrusion (61). Kanao et al. is further cited as teaching that the flange portion is formed with the chip, citing paragraph [0044].

Applicants traverse, and respectfully request the Examiner to reconsider for the following reasons.

In the Amendment filed July 20, 2007, independent claims 1, 13, 18 and 21 were amended to recite that in addition to extending both outwardly and inwardly of imaginary

extension lines of generatrices of a side surface of the protrusion, the weld portion extends below a lowest end of an outer surface of the laser-weld portion.

As shown at pages 12-13 of the Remarks portion of the Amendment filed July 20, 2007, Osamura (Fig. 10) does not disclose a laser weld extending below a lowest end of an outer surface of the laser-weld portion as required by claims 1, 13, 18 and 21 (comparison of Fig. 6 of the invention with Fig. 10 of Osamura). Takamura et al. also does not disclose this characteristic feature of the invention.

The Examiner newly cites Kanao et al., but does not address the above-noted limitation of the independent claims.

In Kanao et al., Ir alloy firing tip 60 is resistance welded to the front end 31 of the center electrode 30 while a pressing force is applied to the circular stem 61 in an axial direction. During the resistance welding, the front end 31 of the center electrode 30 melts due to welding heat, and the circular head 62 sinks into melted portion of the center electrode 30 due to the pressing force applied thereon. This is described in paragraphs [0048] and [0049] of Kanao et al.

That is, Kanao et al. does not disclose laser-welding the flange portion to the joint face to form a weld portion comprising components of both the chip and the electrode base metal as required by the present claims. Notably, there is no laser-welding in Kanao et al., and the circular head 62 is shown as remaining intact as it sinks into the melted portion of the center electrode 30 (i.e., a portion comprising components of both the chip and the electrode base metal is entirely missing from Kanao et al.). More importantly, because Kanao et al. does not disclose

a weld portion, Kanao et al. also does not disclose a weld portion extending below a lowest end of an outer surface of the laser-weld portion as required by the amended claims.

Because none of the applied references discloses this limitation of independent claims 1, 13, 18 and 21, and because the Examiner has not set forth any apparent reason which would lead one skilled in the art to modify the cited prior art so that the weld portion meets the subject claim limitation, the Office Action fails to establish a *prima facie* case of obviousness.¹

Applicants further comment with respect to claim 18 as follows.

Applicants believe that the Examiner has not accurately understood the disclosure of Osamura. At pages 11-12 of the Office Action, Osamura is cited as disclosing "(3) applying a laser beam (item 5) to the flange portion of the chip in an oblique direction to the joint face of the electrode base metal of the ground electrode (see Fig. 3)."

However, as shown in Fig. 3C and Fig. 11 of Osamura, Osamura applies the laser beam in a direction perpendicular to the side surface of the protrusion.

To more clearly distinguish over Osamura, claim 18 has been amended so as to recite applying a laser beam to the flange portion of the chip in an oblique direction to both the joint face of the electrode base metal of the ground electrode and to the side surface of the protrusion.

Additionally, as acknowledged by the Examiner (page 12, lines 9-11 of the Office Action), the laser beam in Osamura (item 5 in Fig. 3C) is not applied to the flange portion of the chip in an oblique direction to the joint face of the electrode base metal of the ground electrode.

¹ To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP § 2143.03

chip in an oblique direction to the joint face of the electrode base metal of the ground electrode.

Clearly, the tip of Osamura does not have a flange, as shown in Figs. 3A and 6A.

Although Kanao et al. proposes a noble tip with a flange portion, the flange portion of the tip is not laser-welded to the ground electrode, but is crimped so as to be wrapped or surrounded by an inside wall of the hole as indicated in Kanao et al.'s claim 1. In other words, the flange portion is not a weld portion welded by a laser. Present claim 18 distinguishes over Kanao et al. in this regard.

Applicants respectfully submit that it is improper to combine Osamura and Kanao et al., because each of the two references fails to disclose a characteristic feature of the invention, namely, (3) applying a laser beam to the flange portion of the chip in an oblique direction to the joint face of the electrode base metal of the ground electrode and to the side surface of the protrusion, so that the weld portion extends below a lowest end of an outer surface of the laser weld portion.

Withdrawal of all rejections and allowance of claims 1, 2, 4-6, 9, 12-18 and 21-30 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

AMENDMENT UNDER 37 C.F.R. § 1.114(c)
U.S. Application No.: 10/695,796

Attorney Docket No.: Q78216

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Respectfully submitted,



Abraham J. Rosner
Registration No. 33,276

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

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Date: October 30, 2007